Assault
Advanced Technology Review Board
ATRB 03-2 Final Report

12 August 2003

PMA 257 PMA 261 PMA 275

PMA 276 PMA 299

Naval Aviation Science and Technology Office
Naval Air Systems Command
Patuxent River, MD

INTRODUCTION

The Third Assault Advanced Technology Review Board (ATRB), designated Assault ATRB 03-2, was held on 12 August 2003 to review and prioritize Assault related S&T project submissions for FY 2004. The Assault ATRB membership consists of:

PEO(A) –OPS(M) – Chairman
Deputy for Operations, PEO(A)
PMA-257
PMA-261
PMA-275
PMA-276
PMA-299
N780F
HQMC (APW)

The Naval Aviation Science and Technology Office (AIR 4.0T) serves as facilitator for the ATRB and is supported by NR Naval Air Systems Command 1187. A representative from the National Defense Industrial Association (NDIA) will be invited in the future to serve on the board as a non-voting member and as a liaison with industry.

The Assault ATRB 03-2 was initiated by a letter from PEO(A) requesting proposals to be submitted to the ATRB. This letter was sent to various Navy R&D activities and to the NDIA for distribution to industry. Six technology proposals were received as a result of the Call Letter and all were selected for review. Five (5) proposals were submitted by industry and one (1) submitted by government personnel working for the Navy. The ATRB used the same evaluation forms, methodology and criteria that were used in previous ATRBs and can be found in Appendix B and C.

At the conclusion of Assault ATRB 03-2, N780 recommended to members of the Board that the following points be considered when evaluating new technologies.

Interoperability and Transformation The proposed technology should support a joint service interoperability process and should support the CNO's goals for transformation.

Operations and Support / Reliability and Maintenance The proposed technology should be centered on O&S and R&M principles to provide the warfighter with the most useable technology to meet the mission.

Technical Advances The proposed technology should center on the principles of smaller, lighter and less expensive then the current technology with emphasis on low power consumption and less heat generation.

EVALUATION PROCESS

The ATRB used a five level rating for each submission. The five levels of rating were: Support, Endorse, Interest, Pass and Concern. Definitions for each of the rating criteria are shown in Table 1.

In addition to rating the projects, the members provided comments on the strengths and weaknesses of the project as described in the submissions. These comments are used to provide feedback to the principal investigators in order to allow project improvement towards a successful technology transition.

Table 1 – Assault ATRB Rating Categories

Support:	The technology has a high probability of transition to a PMA's programs and resources will be budgeted/planned to support transition.
Endorse:	The technology is of high interest and will be placed on a PMA roadmap and followed as it develops. Transition resources will be considered but not budgeted at this time. A subsidiary category, FUNCTIONAL ENDORSE, is used to endorse a general technology concept while NOT endorsing the specific technology in the submittal.
Interest:	The technology has high potential, but is not well enough defined, mature or focused to warrant endorsement at this time. The ATRB will monitor the progress and consider future endorsement as it matures. This category also includes technologies of general interest and importance to Naval Aviation products, but not specific enough to a PMA's product line to warrant endorsement.
Pass:	The technology does not apply or is not well enough defined.
Concern:	The ATR members have a concern or conflict with the technology as presented. These concerns will be forwarded to the technology community.

After the evaluation was completed, the results were used in developing technology roadmaps for each PMA. These roadmaps contain timelines showing when transition opportunities may exist to insert technology upgrades, as well as timelines showing when the technology projects will be ready to transition. S&T projects rated Support, Endorse or Interest have been placed on the PMA Roadmaps. To provide for a smoother and efficient integration of the technology projects into the PMA planning process, a series of follow-up meetings are planned between the PMAs and the principal investigators. Resource sponsors (OPNAV and ONR) will be invited to attend. These meetings are intended to allow the PMA to gain a better understanding of the technology project, to ask detailed questions as to their status, payoff, cost, etc., and to begin a dialog that should expedite the transition of the technology project into their acquisition program.

The results of this ATRB will be sent to N78, ASN(RDA), NAVSTO, ONR and NDIA as a summary of PEO(A)'s view of the projects listed therein. It is intended that these results will assist in the selection of new S&T project starts and to assist OPNAV in supporting budget submissions for the highly rated projects.

RESULTS

A. ATRB Ratings and Grouping - The results of the ATRB evaluation are shown in Table 2. The results grouped by category are shown in Table 3.

B. Technology Roadmaps - Figures 1 through 5 depict technology roadmaps for each Assault PMA.

Table 2 – ATRB Evaluation and Scoring Results

	VOTERS						
S&T PROJECTS	**PMA-257**	**PMA-261**	**PMA-275**	**PMA-276**	**PMA-299**	**HQMC (APW)**	**N780F**
03-2-001 Multifunctional Wire Detection and Sensing of Slung Loads in a High Dust Environment, Goodrich Sensor Systems	Pass	Interest	Interest	Interest	Endorse	Pass	Interest
03-2-002 Ultra-Wide Band (UWB) Altimeter Approach, Raytheon	Pass	Interest	Interest	Interest	Pass	Pass	Interest
03-2-003 Standardized Modular Affordable Retrofit Technology (SMART), Raytheon	Pass	Interest	Interest	Interest	Pass	Interest	Interest
03-2-004 Blue Force Tracker/VMF for Airborne Applications, Raytheon	Interest	Interest	Interest	Endorse Functional	Pass	Endorse	Interest
03-2-005 Low cost Guided Imaging Rocket (LOGIR), China Lake	Interest	Pass	Pass	Endorse	Support	Support	Support
03-2-006 Open System Architecture Display Processor, Raytheon	Pass	Pass	Interest	Interest	Pass	Pass	Interest

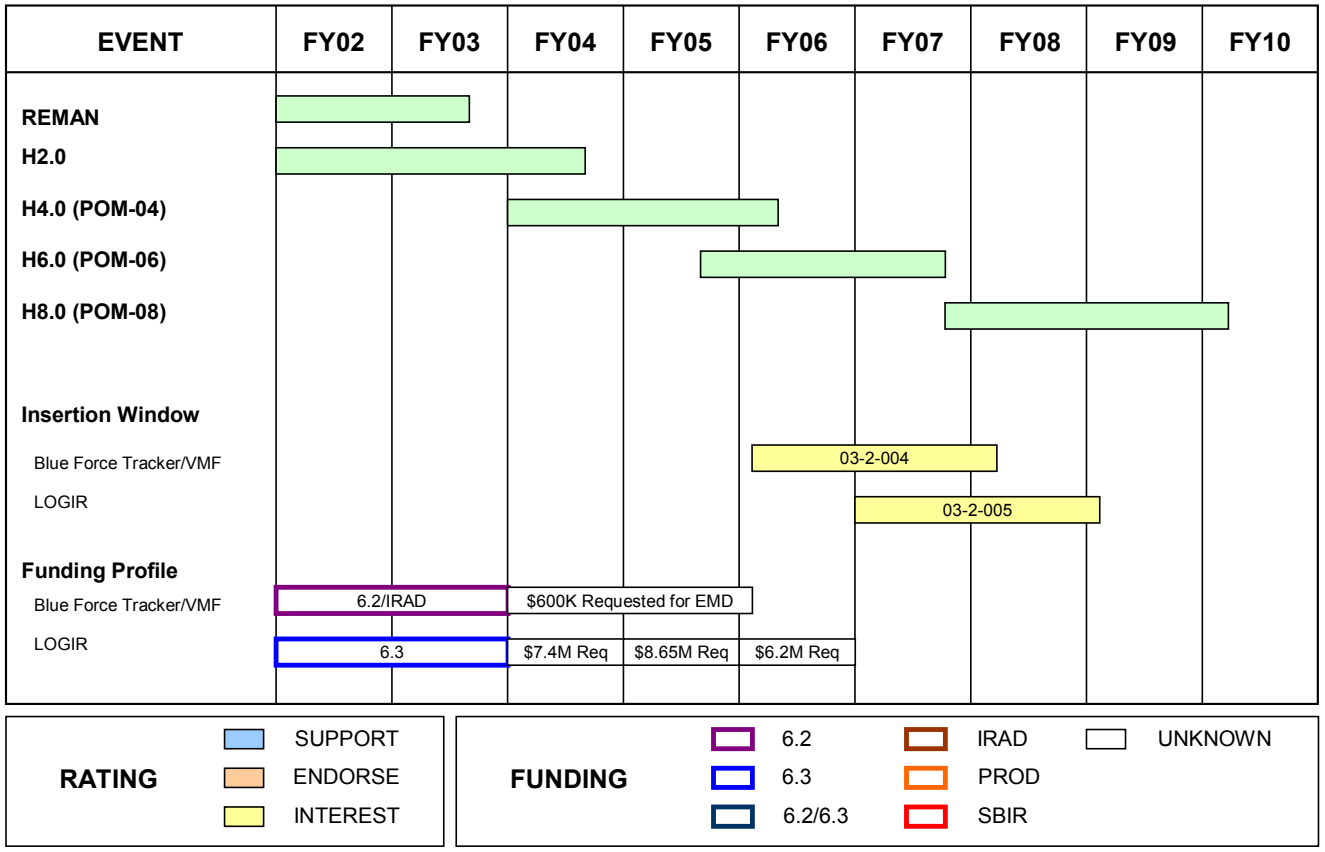
Technology Lead

Table 3 – ATRB Evaluation and Grouping

Support	
03-2-005	Low cost Guided Imaging Rocket (LOGIR)
Endorse	
03-2-001	Multifunctional Wire Detection and Sensing of Slung Loads in a High Dust Environment
03-2-004	Blue Force Tracker/VMF for Airborne Applications
Interest	
03-2-002	Ultra-Wide Band Altimeter Approach
03-2-003	Standardized Modular Affordable Retrofit Technology (SMART)
03-2-006	Open Systems Architecture Display Processor
Pass	
	None
Concern	
	None

NOTE: Interest is in the functional concept, not necessarily in the specific technology.

PMA-257 ROADMAP
ATRB 03-2



Note : Timelines for technology insertion and FNC Enabling Capabilities are estimates not yet approved by the FNC IPTs or the PMAs.

Figure 1 – PMA 257 Technology Insertion Roadmap

PMA-261 ROADMAP
ATRB 03-2

EVENT	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
IMD HUMS									
VH-60N Cockpit Upgrade									
CH-53 SLEP				SYSTEMS INTEGRATION					
VXX									
VHF Communication Suite Upgrade									
Insertion Window									
Multifunctional Wire Detection				03-2-001					
UWB Altimeter Approach				03-2-002					
SMART				03-2-003					
Blue Force Tracker/VMF				03-2-004					
Funding Profile									
Multifunctional Wire Detection	IRAD		$375K Req						
UWB Altimeter Approach	SBIR/IRAD		$250K Req						
SMART	IRAD								
Blue Force Tracker/VMF	6.2/IRAD		$600K Requested for EMD						

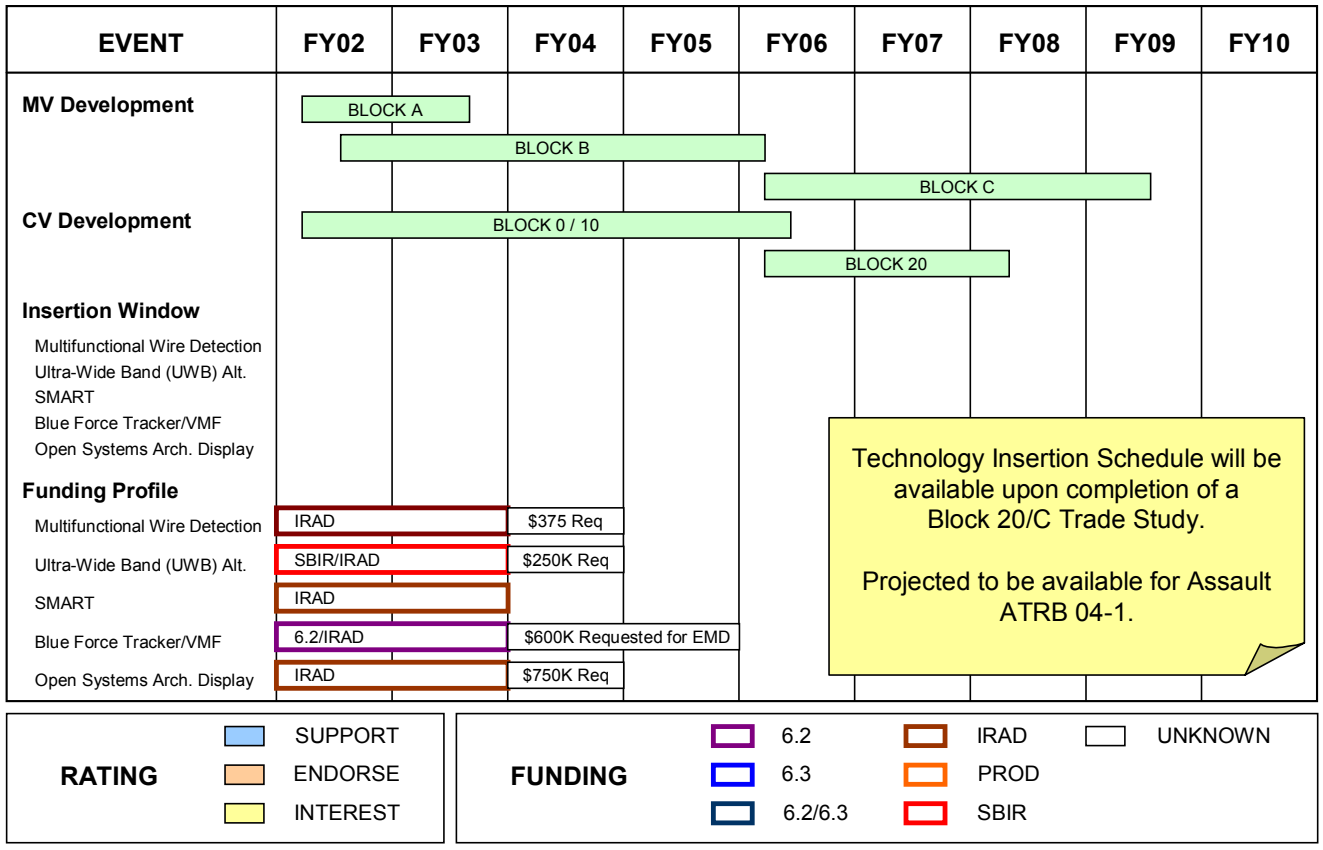
RATING: SUPPORT, ENDORSE, INTEREST

FUNDING: 6.2, 6.3, 6.2/6.3, IRAD, PROD, SBIR, UNKNOWN

Note : Timelines for technology insertion and FNC Enabling Capabilities are estimates not yet approved by the FNC IPTs or the PMAs.

Figure 2 – PMA 261 Technology Insertion Roadmap

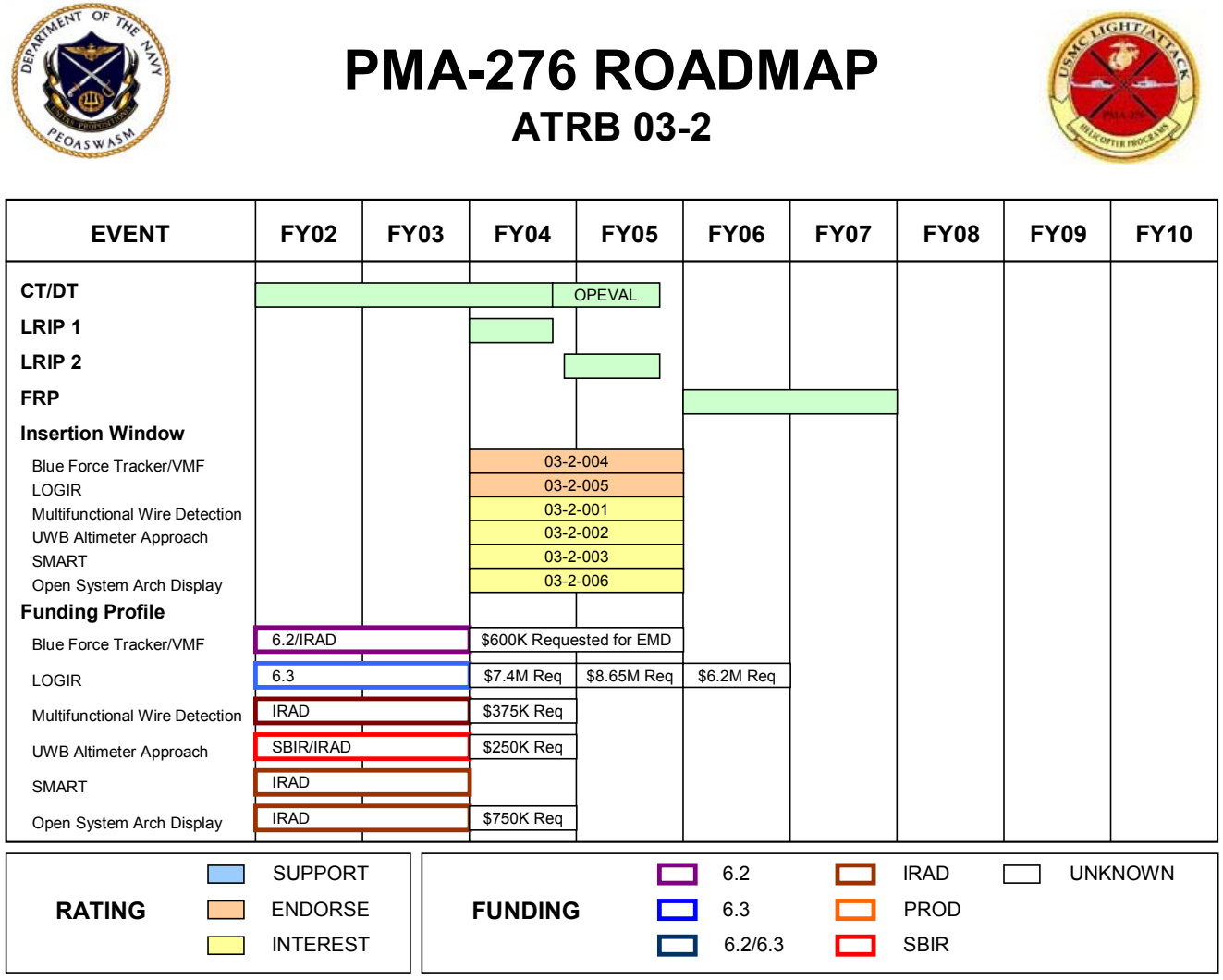
PMA-275 ROADMAP
ATRB 03-2



Note : Timelines for technology insertion and FNC Enabling Capabilities are estimates not yet approved by the FNC IPTs or the PMAs.

Figure 3 - PMA 275 Technology Insertion Roadmap

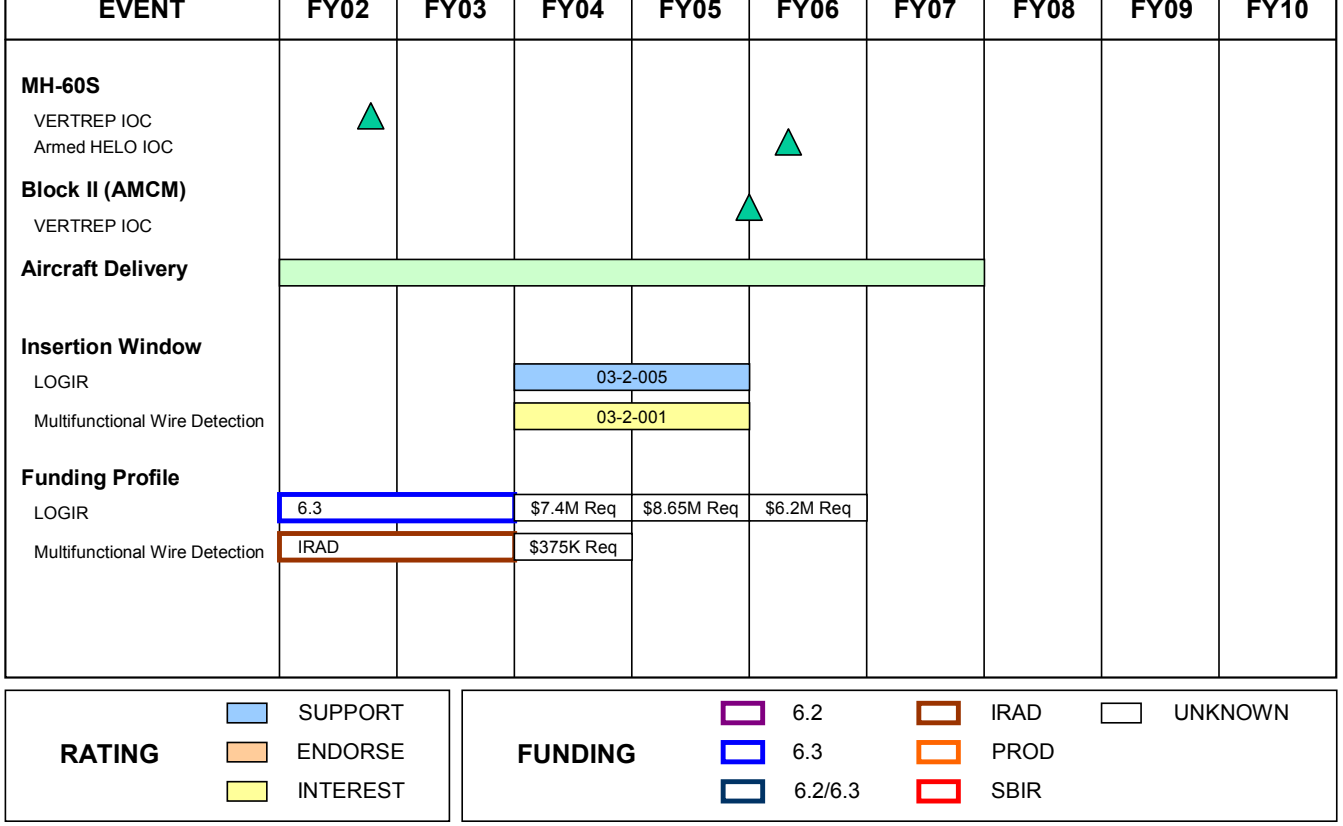
PMA-276 ROADMAP
ATRB 03-2



Note : Timelines for technology insertion and FNC Enabling Capabilities are estimates not yet approved by the FNC IPTs or the PMAs.

Figure 4 - PMA 276 Technology Insertion Roadmap

PMA-299 ROADMAP
ATRB 03-2



Note : Timelines for technology insertion and FNC Enabling Capabilities are estimates not yet approved by the FNC IPTs or the PMAs.

Figure 5- PMA 299 Technology Insertion Roadmap

These roadmaps contain timelines which show the platform system update cycle and when the technology programs would be available. The technology programs are coded by ATRB rating and S&T category. In addition, the roadmaps show some estimates as to the needs that the technology programs could satisfy. The horizontal boxes in the middle of the roadmaps represent the technology programs that apply to the particular platform or system and which could transition into those platforms or systems.

Roadmaps showing the timelines for S&T projects reviewed in earlier ATRBs can be found in the final reports for those ATRBs. These reports are available from the NAVSTO Office.

SUMMARY

The Assault ATRB 03-2 has examined and evaluated 6 S&T proposals with results being forward to ONR, N-780, and HQMC. The ATRB process should positively impact the planning and support for the projects rated either Support or Endorse.

It is gratifying that industry has become a major participant in the Assault ATRB process. This makes the process more effective by providing industry with a vehicle to have their S&T work examined early and for opportunities to transition into major Assault acquisition programs. The next Assault ATRB, 04-1, will be held on April 8, 2004.

ATRB RESULTS HISTORY

As of this report, the Assault ATRB has reviewed 36 S&T proposals. Five (5) were submitted by government activities and 31 were submitted by industry. A complete summary of the results and status of these proposals are contained in Appendix A. The appendix contains information on the title, author, type of work, ATRB rating, lead PMA, and status. It also identifies the enabling capability category within the littoral Assault FNC process the project supports and how the project relates to CNO's priority list. This chart will be updated after each ATRB.

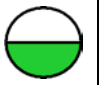
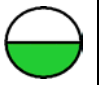
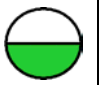
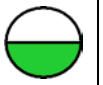
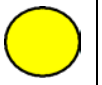
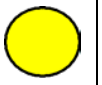
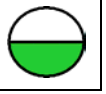
Status is shown in the familiar red-yellow-green "stoplight" format. A green circle indicates that transition planning has started for that project, with funding either in place or planned, to integrate the S&T product into a PMA program. A yellow circle indicates that the lead PMA will continue to monitor the progress of the work and if it appears that the payoff, cost or maturity has been demonstrated, then transition planning may begin. A red circle indicates that no further PMA/PI efforts are warranted, either because the work is not air USW related or the transition potential was deemed low.

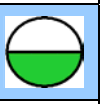
The ATRB process is helping a number of projects begin the transition from science and technology into the acquisition mainstream and is providing the Air USW PMAs an opportunity to get an early look at promising technologies.

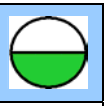
Comments or questions should be directed to Mr. Dave Bailey in the NAVSTO Office. His telephone number is 301-342-0219. His e-mail address is david.b.bailey@navy.mil.

APPENDIX A

ASSAULT ATRB SUBMISSION SUMMARY
THROUGH 03-2

Project Title	ATRB Submitted	Principal Investigator/Activity or Company	On-going/ New Work	Type of Project	CNO Priority Category (Note 3)	Littoral Combat FNC Category	Lead PMA	PMA Mtg Date	On PMA Roadmap	Status (Note 5)
RePLACE	02-1	William J. Cannon TRW Avionics (937) 259-4965	On-going	IR&D	2, 3	3	276	Note 2	No	
CART	02-1-007 03-1-006	David Barton EDAptive Computing (937) 433-0477	On-going	SBIR	2, 3	3	257	Note 2	No	
TCDL	02-1-008 03-1-007	Al Modrovsky/James Perry L-3 Communications (801) 594-3473/3633	New	6.2	2, 3	3,4	257	Note 2	No	
EPLRS	02-1-009 03-1-008	Joseph Norton/Stan Krutsick Raytheon (714) 732-0190/0502	On-going	6.3	2, 3	3,4	257	Note 2	No	
3D Digital Design	02-1	Roger Lindle GE Aircraft Engines (513) 786-5812	New	6.2	2, 3	3		Note 2	No	
CM2A	02-1-019 03-1-009	Dr. David Haas NSWCCD (301) 227-1397	New	6.2/ 6.3	2, 3	3	261	Note 2	No	
IAIMS	02-1	Jim Cycin Sikorsky (203) 386-5664	New	6.2/ 6.3	2, 3	3	261	Note 2	No	
Active Vibration Control	02-1-011 03-1-020	William Welsh Sikorsky (203) 386-6291	New	6.2/ 6.3	2, 3	3	299	Note 2	No	

Project Title	ATRB Submitted	Principal Investigator/Activity or Company	On-going/ New Work	Type of Project	CNO Priority Category (Note 3)	Littoral Combat FNC Category	Lead PMA	PMA Mtg Date	On PMA Roadmap	Status (Note 5)
Advanced Power Mgmt	02-1	Gary Howland Sikorsky (203) 386-3779	New	6.2/ 6.3	2, 3	3		Note 2	No	
Partial Authority Control	02-1-014 03-1-021	John Occhiato Sikorsky (203) 386-5285	New	6.2/ 6.3	2, 3	3	299	Note 2	No	
Full Authority Fly-by-Wire	02-1-013 03-1-022	Bruce Boczar/John Mayo Sikorsky (203) 386-3720/4193	New	6.2/ 6.3	2, 3	3		Note 2	No	
Advanced IR Suppression	02-1	Scott Munro Sikorsky (203) 384-7197	New	6.2/ 6.3	2, 3	3			No	
Low Burden Multispectral Camouflage	02-1	Scott Munro Sikorsky (203) 384-7197	New	6.2/ 6.3	2, 3	3			No	
MUST	02-1	Jerry Rubinsky NAWCAD (310) 342-9355	On-going	6.2	2, 3	3	299	Note 2	No	
Gearbox & Transmission Drive Train Producibility	02-1 023/024 03-1-018	Ed Karades Sikorsky (203) 386-4075	New	IR&D	2, 3	3	299	Note 2	No	
Composite Fuselage	02-1-025 03-1-023	S. P Garbo Sikorsky (203) 386-4576	New	6.2/ 6.3	2, 3	3	299	Note 2	No	
Wire & Obstacle Detection for Helos	03-1-001	Blattel, Ray NAWCWD/ Waveband (937) 259-4965	New	6.3	2, 3	3			No	
Wire and Obstacle Detection and Avoidance	03-1-002	Almsted, Larry Honeywell (612) 951-6521	On-going	Honeywell IR&D	2, 3	3	299		No	

Non-Intrusive Airspeed/Obstacle Sensor	03-1-004	Carico, Dean NAVAIR/OADS (301) 342-1382	On-going	6.3	2, 3	3	275		No	
Project Title	**ATRB Submitted**	**Principal Investigator/Activity or Company**	**On-going/ New Work**	**Type of Project**	**CNO Priority Category (Note 3)**	**Littoral Combat FNC Category**	**Lead PMA**	**PMA Mtg Date**	**On PMA Roadmap**	**Status (Note 5)**
Terrain Following/Terrain Avoidance & Enhanced SA Technologies	03-1-005	Kurtz, Rick TRW (937) 259-4825	On-going	TRW IR&D	2, 3	3			No	
Wire/Obstacle Avoidance	03-1-006	Judge, John SAC (203) 386-5840	New	6.2/6.3	2, 3	3			No	
Structural Load Bearing Phased Array Antenna	03-1-010	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	3,4	275		No	
Sand & Dust Penetrating Radar	03-1-011	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	3	275		No	
Spatial 3-D Audio Enhanced and Aural Cueing	03-1-012	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	4	275		No	
Wireless Intercom System	03-1-013	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	4	299		No	
LPI/LPD Intra-Formation Positioning System	03-1-014	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	3,4			No	
Combat Survivor/Evader secure voice & data link	03-1-015	Butt, Jim Boeing (610) 591-8071	New	IR&D	2, 3	4	299		No	
Individual Blade Control (IBC)	03-1-016	Welsh, William SAC (203) 386-6291	New	IR&D?	2, 3	3	299		No	

Project Title	ATRB Submitted	Principal Investigator/Activity or Company	On-going/ New Work	Type of Project	CNO Priority Category (Note 3)	Littoral Combat FNC Category	Lead PMA	PMA Mtg Date	On PMA Roadmap	Status (Note 5)
Low Cost Growth Rotor Blade (GRB)	03-1-017	Vadasz, Andy SAC (203) 386-4675	New	IR&D?	2, 3	3	299		No	
Helicopter Airframe Producibility	03-1-019	Varanay, Steve SAC	New	IR&D	2, 3	3	299		No	
Multifunctional Wire Detection and Sensing	03-2-001	Flemming, Paul Goodrich Sensor Systems (952) 892-4822	New	IR&D	2,3	3	299		No	
Ultra-Wide Band Altimeter Approach	03-2-002	Hardman, Brian Raytheon (317) 306-4694	New	IR&D	2,3	3			No	
Standardized Modular Afforable Retrofit Technology	03-2-003	Hardman, Brian Raytheon (317) 306-4694	New	IR&D	2,3	3			No	
Blue Force Tracker/VMF for Airborne Applications	03-2-004	Negro, James Raytheon (317) 306-2801	New	IR&D	2,3	3	276		No	
Low cost Guided Imaging Rocket	03-2-005	McCauley, Howard NAWCWEP (760) 939-0546	New	IR&D	2,3	2	276 299		No	
Open System Architecture Display Processor	03-2-006	Negro, James Raytheon (317) 306-2801	New	IR&D	2,3	3			No	

Assault ATRB Submission Summary

Notes:

1. Blue boxes indicate government submittals; white boxes indicate industry submittals.

2. There were no PMA/PI meetings prior to ATRB 02-1.

3. CNO Priority List:
    1. Manpower
    2. Current Readiness
    3. Future Readiness
    4. Quality of Service
    5. Alignment

4. The Littoral Combat FNC Enabling Capabilities are as Follows:
    1. Provide Enhanced Expeditionary ISR For the Amphibious Force (AF).
    2. Provide Enhanced Expeditionary Fire Support for the MAGTF.
    3. Enhance the ability of the MAGTF to Maneuver in the Littorals
    4. Provide Enhanced Expeditionary Task Force Command and Control in the Littorals.

5. (a) Green Circle – PMA/PI transition planning initiated. Funding has either been made available or included in PMA budget session
   (b) Half Green Circle – No transition planning yet, but due to high rating, ATRB will review progress semi-annually.
   (c) Yellow Circle – PMA will continue to monitor work progress.
   (d) Red Circle – No further PMA/PI efforts required.

APPENDIX B

TECHNOLOGY PROGRAM DESCRIPTION FORMAT AND DEFINITIONS

ASSAULT ATRB S&T DESCRIPTION SUBMITTAL FORM

Target PMA(s)/Weapon System(s):_____

Project Title:_____ Date:_____

Principal Investigator:_____ IOC Date (N,M,F):_____

Agency (Code /Company):_____ (<7, <15, 15+ yrs)

Phone Number:_____ Type of Funding:_____

Email:_____ (6.2, 6.3, SBIR, etc)

A. Continuing Project: _____

Funding ($K): Amount used over past _____yrs _____

Funding Requested ($K):_____CFY, _____C+1FY, _____C+2FY

B. New Project: _____

Requested ($K):_____CFY, _____C+1FY, _____C+2FY

PROJECT DESCRIPTION

Describe the technology/project in terms of:

1. What is the objective of the technology/project?
2. What problem does it address? Is it tied to a need/requirement?
3. What is the planned product (documentation, hardware/software demo's, etc) at the conclusion of the technology effort?
4. What is it - i.e., an algorithm, a sensor, a system, etc.?
5. What function does it perform - detection, localization, mission planning, etc.?
6. How does it work?
7. Anything else that will help the board to understand the project!

ADDRESSES VALID NAVY NEED/REQUIREMENT

Is there a documented operational need or warfighting shortfall?

1. Address whether there is a MNS or ORD for the program.
2. Identify whether any of the referenced documents discuss a need for which this type of technology could provide a solution.
3. Specify and identify the source (reference, supporting documentation) of the need such as, PMA technological need/issue, Future Naval Capability (FNC), CCI, Naval messages, etc.

OPERATIONAL PAYOFF

Has the improvement/enhancement been quantified and verified?

1. Describe the benefit and value this technology provides to the platform, the respective PMA or PMAs and the Navy.
2. Discuss what improvements inserting this technology will make.
3. Improvements should be described in terms of operational payoff, I.e., increase in detection range or area coverage, improved capability for rapid target localization in littoral environment, less false alarms, etc.
4. Identify what ops analysis has been done to quantify improvements.

COST/AFFORDABILITY

Has a total life cycle cost analysis been done to show technology is affordable?

1. What is being requested from the PMA? (support such as roadmap insertion and PMA resources or endorsement such as encouragement, potential roadmap insertion).
2. Address what life cycle costing has been done to project what cost savings would be achieved if this technology were inserted into a system or platform.
3. Provide an estimate of the R&D (i.e. 6.3, 6.4) costs to bring the technology to completion and to integrate the technology into an operational system.
4. Current budget for the project?
5. Other potential users or benefactors of this technology?

RISK

Have risk factors (performance, cost, schedule, etc.) been addressed?

1. Discuss what has been done to ensure that the technical, programmatic, and cost risk elements have been addressed or are being addressed.
2. Discuss what testing, both in the laboratory and in the field, has been done to show that technology is being matured.
3. Discuss the schedule to complete R&D on project.
4. Discuss level of maturity of the technology proposed ***(Use DDR&E Technology Readiness Level definitions listed below).***
5. Discuss expectation to be ready to transition to System Development and Demonstration (SD&D).

SUPPORTABILITY

Has the support tail been sufficiently thought out?

1. Address the impact this technology may have on logistic support.
2. Address logistics needs including training and R&M as well as sparing.
3. Will this technology be less costly or more to support than what it is replacing?
4. Will technology be considered off-the-shelf in near future, etc.

TRANSITION POTENTIAL

Is the opportunity to transition real? Has PMA put program into its execution plan?

1. Discuss how much dialogue you have with potential PMAs to solicit their support to transition the technology into their programs.
2. Is the PMA ready to speak out for this technology?
3. Have they included it in their program plans? Provide names, codes and phone numbers.
4. What are the interfaces and outside impacts required to transition the technology?

OPNAV SPONSOR SUPPORT

Is there strong support in OPNAV for program? Who?

1. Discuss how much support there is in OPNAV.
2. Who are the proponents and have they obtained the support of their flags.
3. How much “selling” has been done?
4. Describe nature of interactions, i.e. meetings held, when and how often.
5. Provide POCs, their codes and phone numbers.

DDR&E TECHNOLOGY READINESS LEVELS

Basic Technology Research:
Level 1: Basic principles observed and reported
Research to Prove Feasibility:
Level 2: Technology concept and/or application formulated
Level 3: Analytical and experimental critical function and/or characteristic proof of concept
Technology Development:
Level 4: Component and/or breadboard validation in laboratory environment
Technology Demonstration:
Level 5: Component and/or breadboard validation in relevant environment
Level 6: System/subsystem model or prototype demonstration in a relevant environment (ground space)
System/Subsystem Development:
Level 7: System prototype demonstration in an operational environment
System Test, Launch and Operations:
Level 8: Actual system completed and "flight qualified" through test and demonstration
Level 9: Actual system "flight proven" through successful mission operations

APPENDIX C

EVALUATION FORM
AND
TRANSITION METRICS

ASSAULT ATRB 03-2 EVALUATION FORM

Project Title: **Date:**

Summary Rating: **Rater:**

NEED/REQUIREMENT

Is there a documented operational need or warfighting shortfall?

Strengths: **Weakness:** **Rating: (0 - 5)**	

PAYOFF

Has the improvement/enhancement been quantified and verified?

Strengths: **Weakness:** **Rating: (0 - 5)**	

COST/AFFORDABILITY

Has a total life cycle cost analysis been done to show technology is affordable?

Strengths: **Weakness:** **Rating: (0 - 5)**	

RISK

Have risk factors (performance, cost, schedule, etc.) been addressed?

Strengths: **Weakness** **Rating: (0 - 5)**	

SUPPORTABILITY

Has the support trail been sufficiently thought out?

Strengths

Weakness:

Rating: (0 - 5)

OPNAV SPONSOR SUPPORT

Is there strong support in OPNAV for program? Who?

Strengths:

Weakness:

Rating: (0 - 5)

TRANSITION POTENTIAL

Is the opportunity to transition real? Has PMA put program into its execution plan?

Strengths:

Weakness:

Rating: (0 - 5)

OVERALL COMMENTS:

Transition Criteria/Metric

Criteria #1 - **NEED**. Is there a documented operational need, warfighting shortfall or other (i.e. obsolescence, affordability, supportability) need that this technology could help fill?

4 - 5: A documented requirement exists, such as a MNS or ORD, which defines the shortfall or improvement desired. The need is real and not just a "nice to have" item. The quantity of improvement required is spelled out as well as the time frame within which the improvement is needed. A program sponsor exists or has been identified. A budgetary line item exists that addresses the requirement.

2 - 3: A documented requirement exists (probably in draft form), but the concomitant budget or schedule is not there yet. If no documentation exists, there are at least fleet messages/letters that cite known problem areas. The planning information should be done in time for next POM submission.

0 - 1: There is no documentation to define the requirement. The requirement is being talked about, but has not been formalized.

Criteria #2 - **OPERATIONAL PAYOFF.** There exists some indication that the technology will enhance the operational capability of the aircraft. Another way to look at this criteria is that there is some ultimate benefit that will be derived from the procurement and integration of the end product produced by the S&T project.

4 - 5: The improvement or enhancement has been quantified either as an absolute number (i.e., x more weapons on target) or as a percentage change (i.e., x% increase in range or payload). The improvement can also be either modeled or measured with actual testing. Payoff appears to be high. A plus would be any war gaming (i.e. TIG) that has been done on the technology.

2 - 3: The degree of improvement has been quantified to some extent, but detailed verification of the values has not been done. However, the values are near to being completed and are subject to verification with modeling or testing. Payoff appears to be moderate to high.

0 - 1: The improvements have not been quantified or exist only as numbers on a viewgraph.

Criteria #3 - **RISK.** Has an overall assessment be done of the risk factors affecting successful achievement of the performance objectives? These include such factors as: performance, cost, schedule, degree of difficulty, technical approach, etc.).

4 - 5: Perceived risk is low or manageable within the resources of the program. Technology is sufficiently mature so as to minimize risk. Technology has been tested in a variety of situations, both in lab and in flight. Risk mitigation plans/options are in place. All involved are aware of and accept risk.

2 - 3: Some risk but completely manageable. Technology has been around long enough that its faults are well known and programs are in place to remediate them soon. Some testing has been done and shortcomings are understood. PMA plans allows some tolerance to schedule or performance changes. Changes are not major and do not alter original enhancement or payoff.

0 - 1: Risk is deemed too high based on immaturity of technology or excessive cost or time to bring to fruition. Expected payoff not worth accepting this risk.

Criteria #4 - **LIFE CYCLE COST ANALYSIS.** An analysis of the developmental, production, integration/installation and life cycle support costs of inserting the technology exists or is being addressed.

4 - 5: An analysis of the total life cycle costs of inserting the technology has been done. The cost has been broken down into developmental, production, integration/installation and life cycle support with sufficient detail to serve as the budget numbers. The numbers have been validated using standard cost models or analyses. Costs are reasonable and affordable.

2 - 3: The developmental costing has been completed in detail, but the production and/or life cycle support costs are not well defined yet. However, initial estimates for these costs exist and can be refined without major effort. Costs appear to be somewhat high for integrating and supporting this technology.

0 - 1: No specific costing information exists yet. Only “back of the envelope” estimates or other SWAGs have been done. Considerable effort must go into developing the costs.

Criteria #5 - **SUPPORTABILITY.** The degree to which the planned logistics resources, including manpower, are in place within the existing Navy support system to meet peacetime readiness and wartime utilization requirements.

4 - 5: The technology is easily supported (e.g., COTS based) or is throwaway. The impact of the new technology is to reduce logistic support costs. The technology has such reliability as to not require support within its planned lifetime. The technology can be supported without major changes to the infrastructure or logistics chain.

2 - 3: The technology only requires minor changes to the support system. Any special test equipment, etc. is available or off-the-shelf. Most maintenance can be done at the squadron level. Little depot or other maintenance required.

0 - 1: Major changes to infrastructure required to support the technology. System so complicated that it must be maintained at depot or factory level. Cost of spares very high.

Criteria #6 - **OPNAV SPONSOR SUPPORT.** The technology product has sufficient priority within OPNAV that there is strong willingness to help establish the required budgets and garner flag level support for the program.

4 - 5: The appropriate OPNAV sponsor is thoroughly briefed and supports the transition. Factors to help obtain this support include: joint service potential, mission importance, moneys available, fleet inputs, etc.). Both warfare and program sponsors are in agreement.

2 - 3: General agreement exists, but all wickets have not been passed. Some further work to bring everyone up to speed and on-board needs to be done. But this is feasible since no major obstacles exist.

0 - 1: No major claimant for program. Fleet isn't clamoring for program. Support divided along deep lines and much effort required to "sell" program. Payoff doesn't support effort required.

Criteria #7 - **TRANSITION POTENTIAL.** This criteria relates to what real opportunities exist to transition technology into systems and/or platforms.

4 - 5: A sponsor (i.e., platform or commodity PMA) has indicated a desire to transition the technology into their system. The transition has been included in their budget (i.e., PE number exists) and they have identified a suitable window when it can occur.

2 - 3: A sponsor has expressed interest based on maturity or potential payoff of the technology and is planning to include it into their next POM submittal. They have begun looking at a suitable window for insertion.

0 - 1: No sponsor has identified this technology yet as one they desperately need. They are awaiting further development and/or test results.